GRIB2
THE WMO STANDARD FOR THE TRANSMISSION OF GRIDDED DATA

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GRIB

WMO Standard forTransmitting GRIDDED Data

- Version I--GRIdded Binary (1988)
- Version II-- General Regularly distributed Information Binary (2001)
  - WMO declared official November 2001

Eight Sections

Section 0 – Indicator

Section 1 – Identification

Section 2 – Local Use

Section 3 – Grid Definition

Section 4 – Product Definition

Section 5 – Data Representation

Section 6 – Bit-Map

Section 7 – Data

Section 8 – End

Packing Options

- Simple
  - Same as Version I
- Complex
  - Same as Version I with options
- Complex with Spatial Differencing
  - Incorporates spatial differencing of any order (1st, 2nd, etc.)

Simple Option

- Round to accuracy desired
- Subtract minimum value in field
  - All values are now zero or positive
- Use number of bits for every value required for largest value

Complex Option

- Round to desired accuracy
- Subtract minimum value in field
- Order boustrophedonically, if desired
- Put into groups of consecutive values of similar magnitude
- Subtract minimum of each group from group values

Complex Option

- Each group individually packed in same manner as Simple Option
- Must carry for each group
  - Group minimum
  - Bits required for the group
  - Length of group (number of values in group)

Complex Option with Spatial Differencing

- Round to desired accuracy
- Subtract minimum value
- Orderboustrophedonically
- Compute 1st, 2nd, or other order differences
- Continue with Complex Option

Status

- Tested by a number of organizations in different countries (e.g., NCEP, MDL, EMCWF, Meteo France, Japan)
- Declared operational by WMO in November 2001
- Encoder/Decoder pair with documentation on NWS encoder/decoder web site
  - < http://www.nws.noaa.gov/mdl/iwt
  - < Maintained by MDL

Status

- Version I must be used for specific data sets by agreement with some organizations
- Likely transition over a number of years to Version II
  - Grids being sent from WFOs to the National Digital Forecast Database (NDFD) in Version II
  - Grids being made available from the NDFD are in Version II
  - Upgrading of AWIPS hardware and software will allow Version II on the Satellite Broadcast System

NWS Encoder/Decoder

- Not all options in GRIB2 coded and tested (e.g., Rotated spherical harmonic coefficients)
- A specific format for the Local Use Section is provided with Simple packing

NWS Encoder/Decoder

- NWS Encoder/Decoder Pair has many options
  - Input can be integer or floating point data
  - Input can include a bit map for misisng values or missing values can be imbedded in the array
  - Boustrophedonic ordering is done upon request, but only if efficient
  - A Local Use Section format is provided

NWS Encoder/Decoder

- Second order spatial differencing provided
- Two types of missing values are accommodated for Complex and Complex with spatial differencing
- Diagnostic numbers provided to calling routine in an array of three designated types
  - 0 = Information only to monitor progress
  - 1 = Unusual in some sense, but not fatal
  - 2 = fatal, with routine abort to calling program

Packing Efficiency of NWS Encoder

- Model data (e.g., 500-Mb heights)
  - GRIB2 product size about 45% of original Simple Version Product normally used at NCEP
  - Works well with 2nd order differencing
- Radar data
  - GRIB2 product size about 50% of original run-length encoded product
  - Highly variable (run-length encoding inefficient for large areas of the same value, while GRIB2 very efficient)
  - Generally spatial differencing is less efficient than no differencing

Packing Efficiency of NWS Encoder

- Satellite data
  - GRIB2 product size about 60% of original of 1 byte per value (pixel) currently used for data on the AWIPS Satellite Broadcast Network Satellite Data

Bottom Line

- Data from the National Digital Forecast Database are in GRIB2
- Efficient NWS encoder/decoder pair with documentation available on web: http://www.nws.noaa.gov/mdl/iwt
- Driver and details on how to download and use decoder on web: http://www.nws.noaa.gov/mdl/degrib
- Details on how to download and use decoder provided at NWS booth in Exhibit Hall